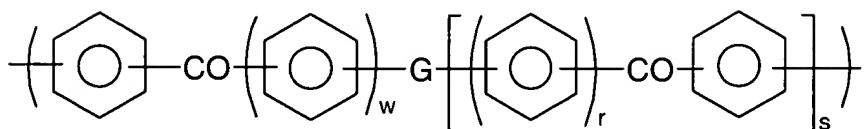


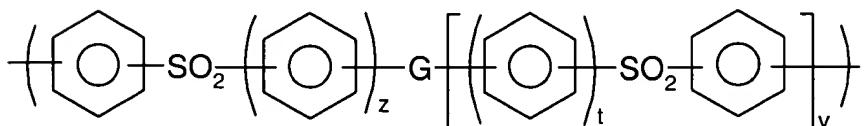
I

and/or a moiety of formula



II

and/or a moiety of formula

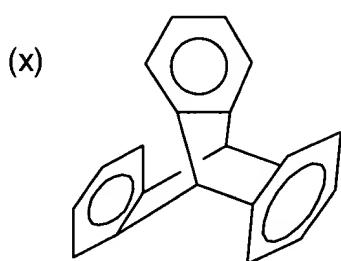
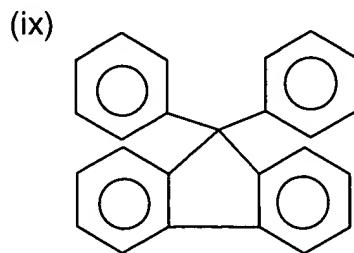
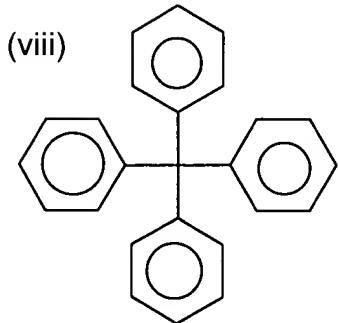
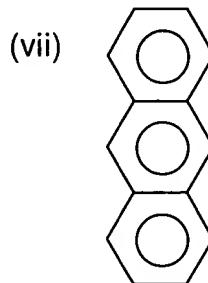
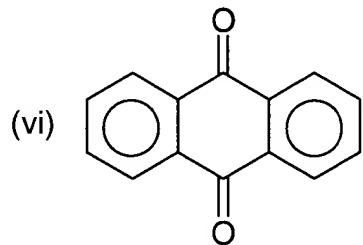
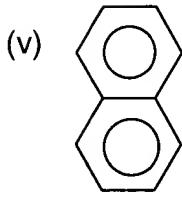
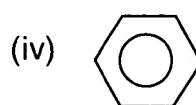
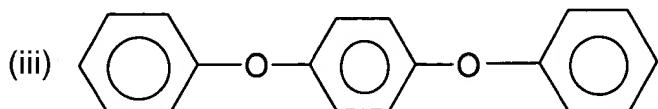
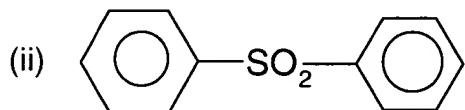
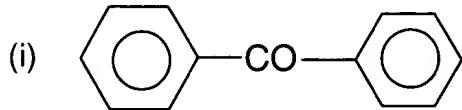


III

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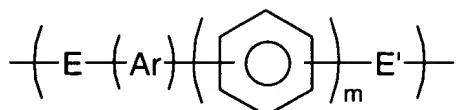
wherein at least some of the units I, II, and/or III are sulphonated; wherein the phenyl moieties in units I, II and III are independently optionally substituted and optionally cross-linked; and wherein m, r, s, t, v, w and z independently represent zero or a positive integer, E and E' independently represent an oxygen or a sulphur atom or a direct link, G represents an oxygen or a sulphur atom, a direct link or a -O-Ph-O- moiety where Ph represents a phenyl group and Ar is selected from one of the following moieties (i) to (x) which is bonded via one or more of its phenyl moieties to adjacent moieties, wherein said

polymer includes at least some ketone moieties in the polymeric chain and
wherein said polymer includes a multi-phenylene moiety bonded to two oxygen
atoms or a fused ring aromatic moiety bonded to two oxygen atoms



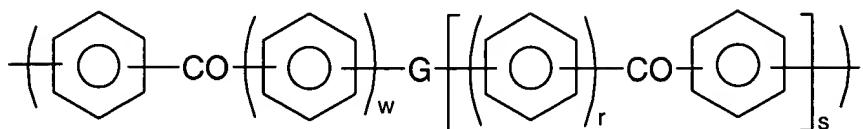
70 (New). A device selected from a fuel cell incorporating a polymer
electrolyte membrane, an electrolyser incorporating a polymer electrolyte
membrane and a gas diffusion electrode, wherein said polymer electrolyte

membrane or said gas diffusion electrode includes a polymer having a moiety of formula



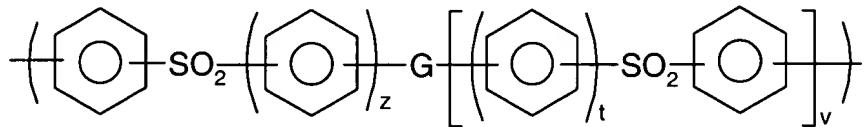
I

and/or a moiety of formula



II

and/or a moiety of formula



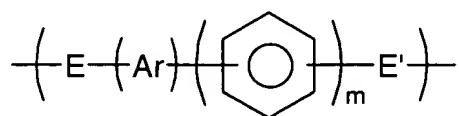
III

wherein at least some of the units I, II, and/or III are functionalised to provide ion exchange sites; wherein the phenyl moieties in units I, II and III are independently optionally substituted and optionally cross-linked; and wherein m,r,s,t,v,w and z independently represent zero or a positive integer, E and E'

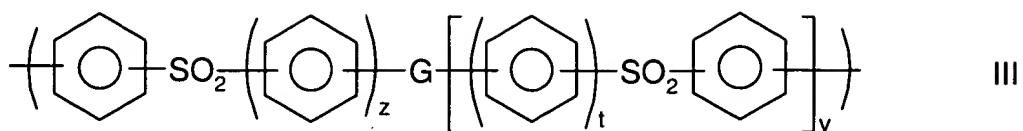
independently represent an oxygen or a sulphur atom or a direct link, G represents an oxygen or a sulphur atom, a direct link or a -O-Ph-O- moiety where Ph represents a phenyl group and Ar is selected from one of the following moieties (i) to (x) which is bonded via one or more of its phenyl moieties to adjacent moieties, wherein said polymer includes at least some ketone moieties in the polymeric chain and wherein said polymer includes a multi-phenylene moiety bonded to two oxygen atoms or a fused ring aromatic moiety bonded to two oxygen atoms

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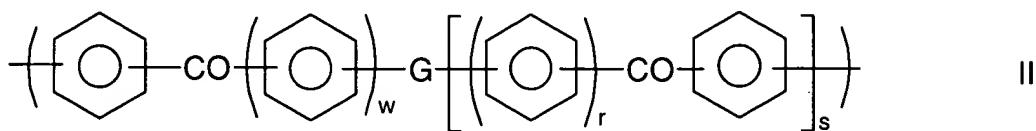
71 (New). A device selected from a fuel cell incorporating a polymer electrolyte membrane, an electrolyser incorporating a polymer electrolyte membrane and a gas diffusion electrode, wherein said polymer electrolyte membrane or said gas diffusion electrode includes a polymer having a moiety of formula



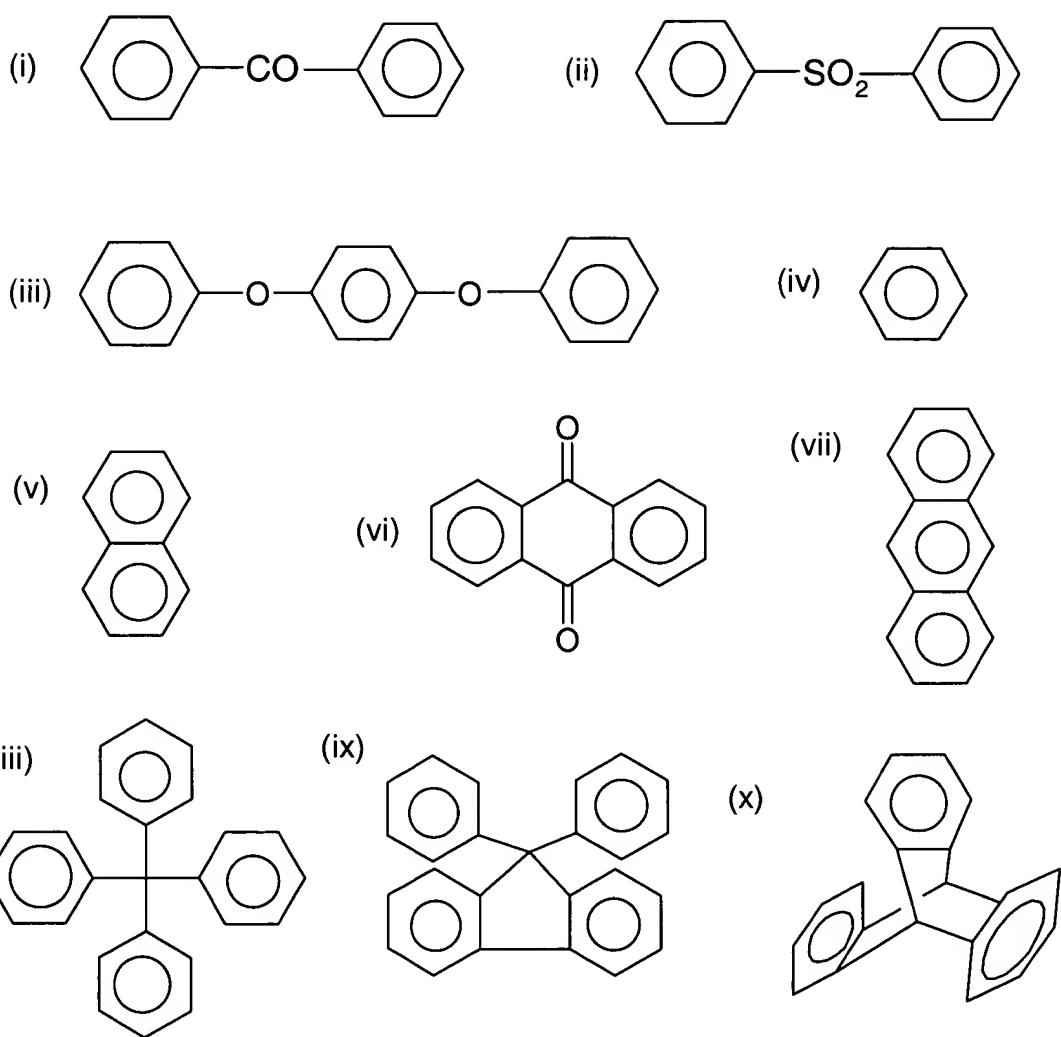
and/or a moiety of formula



and/or a moiety of formula



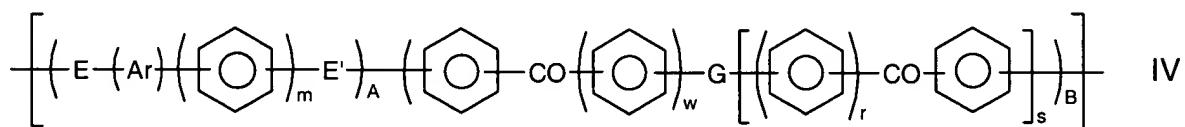
wherein at least some of the units I, II, and/or III are functionalised to provide ion exchange sites; wherein the phenyl moieties in units I, II and III are independently optionally substituted and optionally cross-linked; and wherein m, r, s, t, v, w and z independently represent zero or a positive integer, E and E' independently represent an oxygen or a sulphur atom or a direct link, G represents an oxygen or a sulphur atom, a direct link or a $-O-Ph-O-$ moiety where Ph represents a phenyl group and Ar is selected from one of the following moieties (i) to (x) which is bonded via one or more of its phenyl moieties to adjacent moieties, wherein said polymer is crystalline



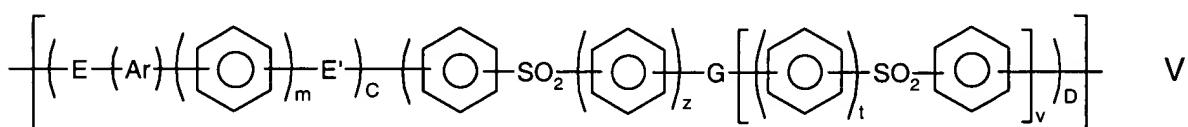
72 (New). A device according to claim 69, wherein "a" represents the mole % of units of formula I in said polymer; "b" represents the mole % of units of formula II in said polymer; and "c" represents the mole % of units of formula III in said polymer and wherein a is in the range 45-55 and the sum of b and c is in the range of 45-55.

73 (New). A device according to claim 69, wherein said polymer consists essentially of moieties I, II and/or III.

74 (New). A device according to claim 69, wherein said polymer is a random or block copolymer having a first repeat unit of general formula



or of general formula



and a second repeat unit of general formula IV or V,

wherein A, B, C and D independently represent 0 or 1.

75 (New). A device according to claim 74, wherein said polymer includes at least one repeat unit of formula IV.

76 (New). A device according to claim 74, wherein said polymer is a copolymer comprising a first repeat unit of formula IV wherein E and E' represent oxygen atoms, G represents a direct link, Ar represents a moiety of structure (iv), m represents 1, w represents 1, s represents zero, A and B represent 1; and

a second repeat unit of formula V wherein E and E' represent oxygen atoms, Ar represents a structure (i), m represents 0, C represents 1, z represents 1, G represents a direct link, v represents 0 and D represents 1.

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cont.*
77 (New). A device according to claim 74, wherein said polymer is a copolymer comprising a first repeat unit of formula IV, wherein E and E' represent oxygen atoms, G represents a direct link, Ar represents a moiety of structure (iv), m represents 1, w represents 1, s represents 0, A and B represent 1.

78 (New). A device according to claim 74, wherein said polymer is a copolymer comprising a first repeat unit of formula IV wherein E and E' represent oxygen atoms, G represents a direct link, Ar represents a moiety of structure (iv), m represents 1, w represents 1, s represents 0, A and B represent 1; and a second repeat unit of formula IV wherein E represents an oxygen atom, E' represents a direct link, Ar represents a moiety of structure (i), m represents zero, A represents 1, B represents 0.

79 (New). A device according to claim 74, wherein said polymer is a copolymer comprising a first repeat unit which is either:

(a') of formula IV wherein E and E' represent oxygen atoms, G represents a direct link, Ar represents a moiety of structure (iv), m and s represent zero, w represents 1 and A and B represent 1; or

(b') of formula IV wherein E represents an oxygen atom, E' represents a direct link, Ar represents a moiety of structure (i), m represents zero, A represents 1, B represents zero;

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and a second repeat unit which is either:

(c') of formula IV wherein E and E' represent oxygen atoms, G represents a direct link, Ar represents a moiety of structure (iv), m represents 1, w represents 1, s represents zero, A and B represent 1; or

(d') of formula IV wherein E represents an oxygen atom, E' is a direct link, G represents a direct link, Ar represents a moiety of structure (iv), m and s represent zero, w represents 1, A and B represent 1.

80 (New). A device according to claim 74, wherein said polymer has a repeat unit selected from

(a') of formula IV wherein E and E' represent oxygen atoms, G represents a direct link, Ar represents a moiety of structure (iv), m and s represent zero, w represents 1 and A and B represent 1; or

(b') of formula IV wherein E represents an oxygen atom, E' represents a direct link, Ar represents a moiety of structure (i), m represents zero, A represents 1, B represents zero;

P. Paul
in combination with a repeat unit of formula IV wherein E and E' represent oxygen atoms, G represents a direct link, Ar represents a moiety of structure (iv), m represents 1, w represents 1, s represents zero, A and B represent 1.

81 (New). A device according to claim 74, comprising a first repeat unit which is selected from the following:

(a) a unit of formula IV wherein E and E' represent oxygen atoms, G represents a direct link, Ar represents a moiety of structure (iv), m and s represent zero, w represents 1 and A and B represent 1;

(b) a unit of formula IV wherein E represents an oxygen atom, E' represents a direct link, Ar represents a moiety of structure (i), m represents zero, A represents 1, B represents zero;

(c) a unit of formula V wherein E and E' represent oxygen atoms, G represents a direct link, Ar represents a moiety of structure (iv), m and v represent zero, z represents 1 and C and D represent 1;

(d) a unit of formula V wherein E represents an oxygen atom, E' represents a direct link, Ar represents a moiety of structure (ii), m represents 0, C represents 1, D represents 0; or

(e) a unit of formula V wherein E and E' represents an oxygen atom, Ar represents a structure (i), m represents 0, C represents 1, Z represents 1, G represents a direct link, v represents O and D represents 1;

and a second repeat unit which is selected from the following:

(f) a unit of formula IV wherein E and E' represent oxygen atoms, G represents a direct link, Ar represents a moiety of structure (iv), m represents 1, w represents 1, s represents zero, A and B represent 1;

(g) a unit of formula IV wherein E represents an oxygen atom, E' is a direct link, G represents a direct link, Ar represents a moiety of structure (iv), m and s represent zero, w represent 1, A and B represent 1;

(h) a unit of formula V wherein E and E' represent oxygen atoms, G represents a direct link, Ar represents a moiety of structure (iv), m represents 1, z represents 1, v represents 0, C and D represent 1; and

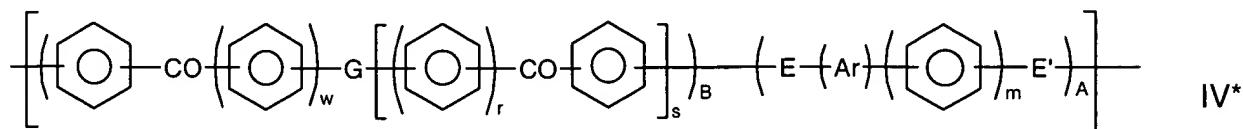
(i) a unit of formula V wherein E represents an oxygen atom, E' represents a direct link, G represents a direct link, Ar represents a moiety of structure (iv), m and v represent zero, z represents 1, C and D represent 1.

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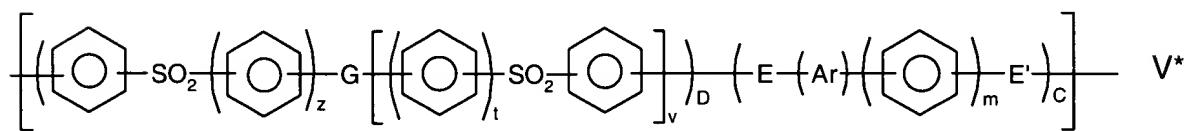
81 (New). A device according to claim 74, wherein said second unit is selected from a unit of formula IV wherein E and E' represent oxygen atoms, G represents a direct link, Ar represents a moiety of structure (v), m represents 0, w represents 1, s represents 0, A and B represent 1; or a unit of formula V wherein E and E' represent oxygen atoms, G represents a direct link, Ar represents a moiety of structure (v), m represents 0, z represents 1, v represents 0, c and d represent 1.

82 (New). A device according to claim 80, wherein said copolymer has a first repeat unit selected from units (b), (d) or (e) in combination with a second repeat unit selected from units (f) or (h).

83 (New). A device according to claim 69, wherein said polymer is a copolymer having a first repeat unit of general formula



or of general formula



and a second repeat unit of general formula IV* or V*, wherein A, B, C and D independently represent 0 or 1.

84 (New). A device according to claim 83, wherein said polymer includes: a repeat unit of formula IV* wherein Ar represents a moiety of structure (v), E represents a direct link, E' represents an oxygen atom, G represents a direct link, w, s and m represent 0, A and B represent 1; and/or a repeat unit of formula V* wherein Ar represents a moiety of structure (v), E represents a direct link, E' represents an oxygen atom, G represents a direct link, z, v and m represent 0, C and D represent 1.

85 (New). A device according to claim 84 which includes a repeat unit of formula IV* or V* and a unit selected from the following:

(a) a unit of formula IV wherein E and E' represent oxygen atoms, G represents a direct link, Ar represents a moiety of structure (iv), m and s represent zero, w represents 1 and A and B represent 1;

(b) a unit of formula IV wherein E represents an oxygen atom, E' represents a direct link, Ar represents a moiety of structure (i), m represents zero, A represents 1, B represents zero;

(c) a unit of formula V wherein E and E' represent oxygen atoms, G represents a direct link, Ar represents a moiety of structure (iv), m and v represent zero, z represents 1 and C and D represent 1;

(d) a unit of formula V wherein E represents an oxygen atom, E' represents a direct link, Ar represents a moiety of structure (ii), m represents 0, C represents 1, D represents 0;

(e) a unit of formula V wherein E and E' represents an oxygen atom, Ar represents a structure (i), m represents 0, C represents 1, Z represents 1, G represents a direct link, v represents 0 and D represents 1;

(f) a unit of formula IV wherein E and E' represent oxygen atoms, G represents a direct link, Ar represents a moiety of structure (iv), m represents 1, w represents 1, s represents zero, A and B represent 1;

(g) a unit of formula IV wherein E represents an oxygen atom, E' is a direct link, G represents a direct link, Ar represents a moiety of structure (iv), m and s represent zero, w represent 1, A and B represent 1;

(h) a unit of formula V wherein E and E' represent oxygen atoms, G represents a direct link, Ar represents a moiety of structure (iv), m represents 1, z represents 1, v represents 0, C and D represent 1; and

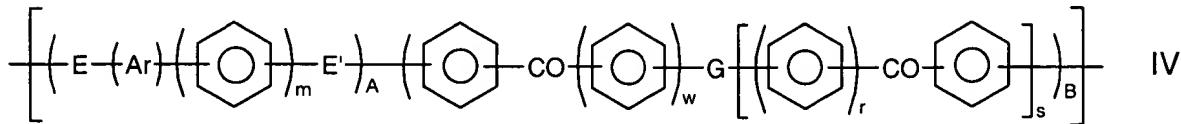
(i) a unit of formula V wherein E represents an oxygen atom, E' represents a direct link, G represents a direct link, Ar represents a moiety of structure (iv), m and v represent zero, z represents 1, C and D represent 1.

86 (New). A device according to claim 69, wherein Ar is selected from moieties (i), (ii), (iv) and (v).

87 (New). A device according to claim 69, wherein said polymer includes a -O-biphenylene-O- moiety or a -O-naphthalene-O-moiety.

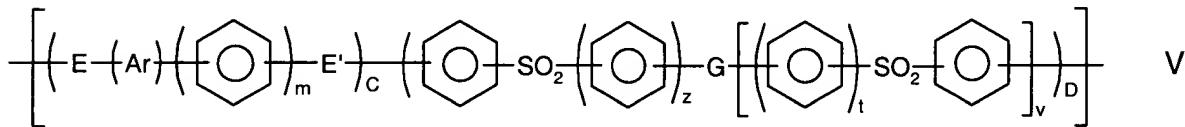
88 (New). A device according to claim 71, wherein said polymer includes at least some ketone moieties.

89 (New). A device according to claim 71, wherein said polymer is a random or block copolymer having a first repeat unit of general formula



*(b)
but -*

or of general formula



and a second repeat unit of general formula IV or V,

wherein A, B, C and D independently represent 0 or 1.

90 (New). A device according to claim 69, wherein said polymer has a glass transition temperature (Tg) of at least 144°C.

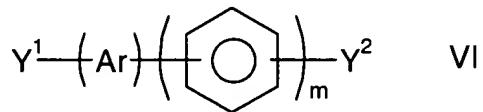
91 (New). A device according to claim 69, wherein said glass transition temperature is at least 154°C.

92 (New). A device according to claim 69, wherein said polymer has an inherent viscosity of at least 0.3.

93 (New). A device according to claim 69, wherein said device is a fuel cell.

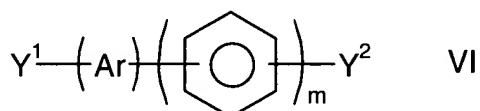
94 (New). A device selected from a fuel cell incorporating a polymer electrolyte membrane, an electrolyser incorporating a polymer electrolyte membrane and a gas diffusion electrode, wherein said polymer electrolyte membrane or said gas diffusion electrode includes a polymer which includes at least some ketone moieties in the polymeric chain and includes a multi-phenylene moiety bonded to two oxygen atoms or a fused ring aromatic moiety bonded to two oxygen atoms, said polymer being made in a process comprising:

(a) polycondensing a compound of general formula

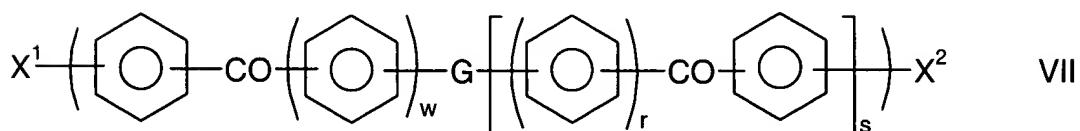


with itself wherein Y^1 represents a halogen atom or a group $\cdot EH$ and Y^2 represents a halogen atom or, if Y^1 represents a halogen atom, Y^2 represents a group $E'H$; or

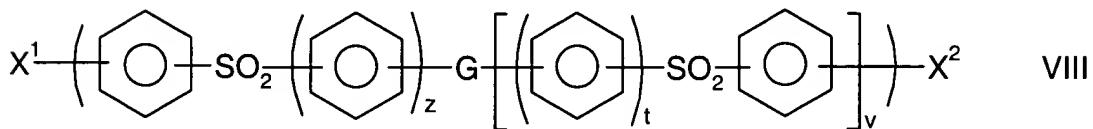
(b) polycondensing a compound of general formula



with a compound of formula



and/or with a compound of formula



wherein Y¹ represents a halogen atom or a group -EH (or -E'H if appropriate) and Y² represents a halogen atom or a group -E'H and X² represents the other one of a halogen atom or a group -E'H (or EH of appropriate); and

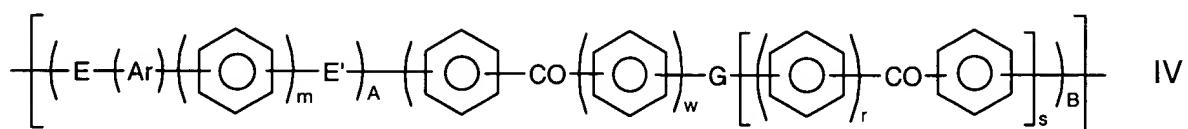
(c) optionally copolymerizing a product of a process as described in paragraph (a) with a product of a process as described in paragraph (b);

wherein the phenyl moieties of units VI, VII and/or VIII are optionally substituted; the compounds VI, VII and/or VIII are optionally sulphonated; and Ar, m, w, r, s, z, t, v, G, E and E' are as described in claim 1 except that E and E' do not represent a direct link; the process also optionally comprising sulphonating and/or cross-linking a product of the reaction described in paragraphs (a), (b) and/or (c) to prepare said polymer.

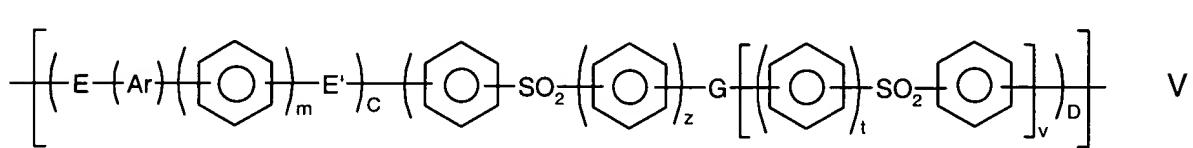
95 (New). A process according to claim 94, wherein sulphonation is carried out in concentrated sulphuric acid at an elevated temperature.

96 (New). A process according to claim 95, wherein said concentrated sulphur acid comprises less than 98.5% w/w of said sulphuric acid.

97 (New). A copolymer having a first unit of general formula



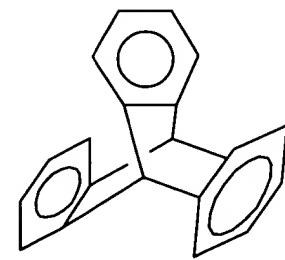
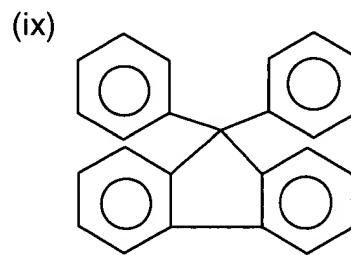
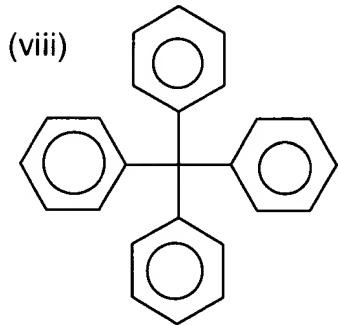
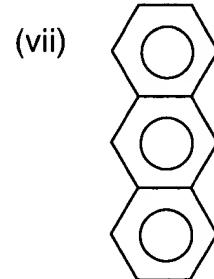
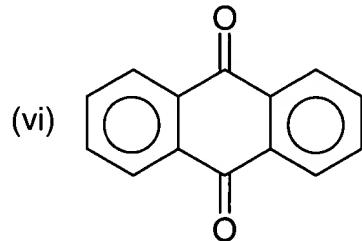
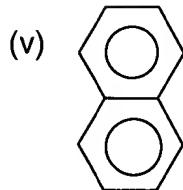
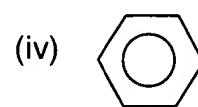
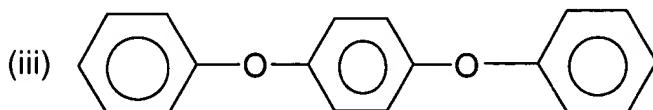
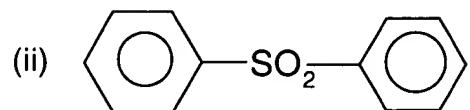
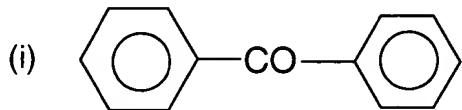
or of general formula



and a second unit of general formula IV or V,

wherein at least some of units IV and V are functionalised to provide ion-exchange sites; wherein phenyl moieties in IV and V are independently optionally substituted and optionally cross-linked; wherein m, r, s, t, v w and z independently represent zero or a positive integer, E and E' independently represent an oxygen or a sulphur atom or a direct link, G represents an oxygen or a sulphur atom, a direct link or a $-O\text{-Ph-O-}$ moiety wherein Ph represents a phenyl group and Ar is selected from one of the following moieties (i) to (x) which is bonded via one or more of its phenyl moieties to adjacent moieties, wherein said copolymer includes at least some ketone moieties in the polymeric chain and

wherein said polymer includes a multi-phenylene moiety bonded to two oxygen atoms or a fused ring aromatic moiety bonded to two oxygen atoms



98 (New). A copolymer according to claim 97, wherein at least some of units IV and V are sulphonated.

99 (New). A copolymer according to claim 97, wherein said copolymer includes a first repeat unit of formula IV, wherein E and E' represent oxygen atoms, G represents a direct link, Ar represents a moiety of structure (iv), m represents 1, w represents 1, s represents 0, A and B represent 1.

100 (New). A copolymer according to claim 97, wherein said copolymer includes a second unit selected from a unit of formula IV wherein E and E' represent oxygen atoms, G represents a direct link, Ar represents a moiety of structure (v), m represents 0, w represents 1, s represents 0, A and B represent 1; and a unit of formula V wherein E and E' represent oxygen atoms, G represents a direct link, Ar represents a moiety of structure (v), m represents 0, z represents 1, v represents 0, c and d represent 1.

101 (New). A copolymer according to claim 97, wherein said copolymer includes a first repeat unit of formula IV wherein E and E' represent oxygen atoms, G represents a direct link, Ar represents a moiety of structure (iv), m represents 1, w represents 1, s represents zero, A and B represent 1; and

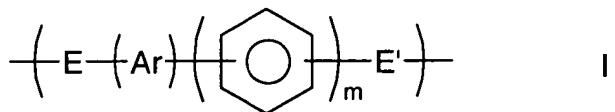
a second repeat unit of formula V wherein E and E' represent oxygen atoms, Ar represents a structure (i), m represents 0, C represents 1, z represents 1, G represents a direct link, v represents 0 and D represents 1.

102 (New). A copolymer according to claim 97, wherein said copolymer includes a first repeat unit of formula IV wherein E and E' represent oxygen atoms, G represents a direct link, Ar represents a moiety of structure (iv), m represents 1, w represents 1, s represents 0, A and B represent 1; and a second repeat unit of formula IV wherein E represents an oxygen atom, E' represents a direct link, Ar represents a moiety of structure (i), m represents zero, A represents 1, B represents 0.

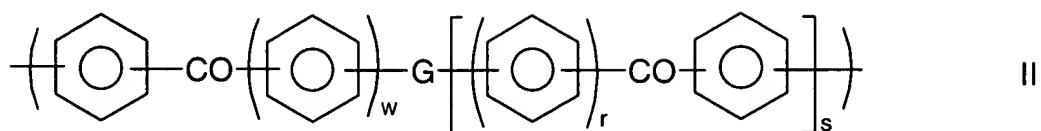
103 (New). A copolymer according to any of claims 99 to 102, wherein at least some of units IV and V are sulphonated.

104 (New). A device according to claim 69 or claim 70, wherein said polymer is crystalline.

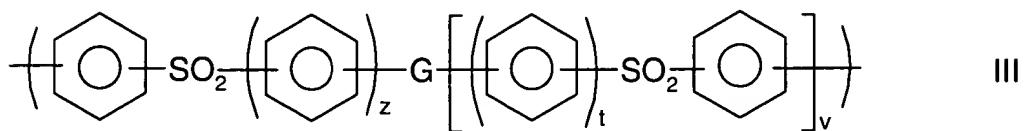
105 (New). A polymer electrolyte membrane which includes a polymer having a moiety of formula



and/or a moiety of formula

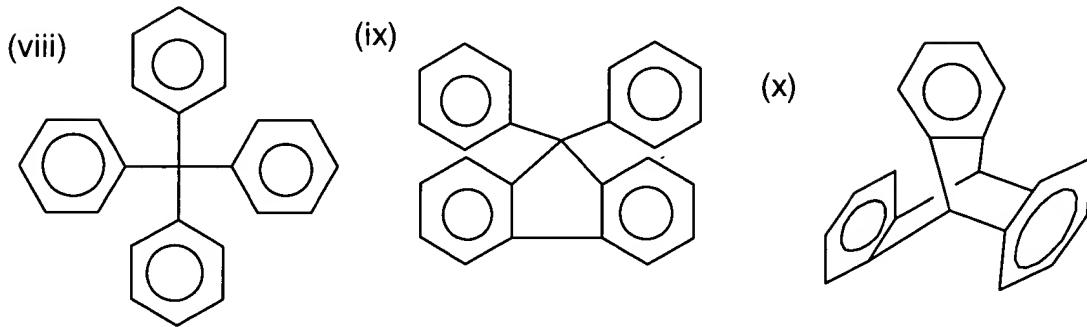
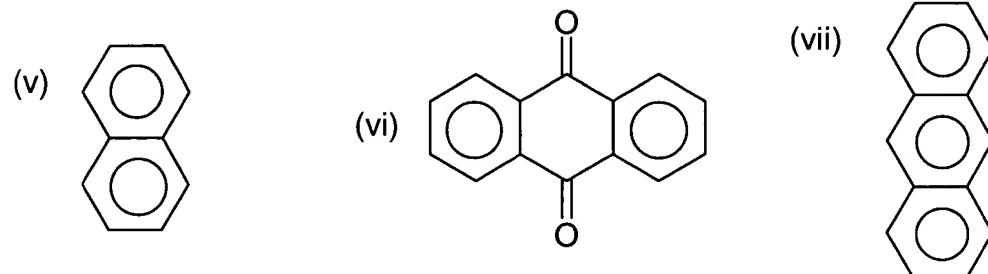
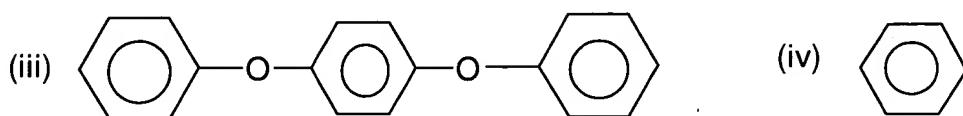


and/or a moiety of formula



wherein at least some of the units I, II, and/or III are sulphonated; wherein the phenyl moieties in units I, II and III are independently optionally substituted and optionally cross-linked; and wherein m,r,s,t,v,w and z independently represent zero or a positive integer, E and E' independently represent an oxygen or a sulphur atom or a direct link, G represents an oxygen or a sulphur atom, a direct link or a -O-Ph-O- moiety where Ph represents a phenyl group and Ar is selected from one of the following moieties (i) to (x) which is bonded via one or more of its phenyl moieties to adjacent moieties, wherein said polymer includes at least some ketone moieties in the polymeric chain and

wherein said polymer includes a multi-phenylene moiety bonded to two oxygen



atoms or a fused ring aromatic moiety bonded to two oxygen atoms